REMARKS

Claims 1-45 are pending in the present application. Claims 1, 22 and 30 have been amended herein to clarify the meaning of the term "migration" in accordance with the invention. No new matter has been added.

Claims 1-8, 12-13, 16, 21-22, 27-35 and 39 stand rejected under 35 U.S.C. § 102 as allegedly anticipated by U.S. Patent No. 6,385,706 (Ofek et al.). Claims 9-11 and 36-38 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of "A Simple and Efficient Parallel Disk Mergesort" (Barve et al.). Claims 14 and 41 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of U.S. Patent No. 5,864,863 (Boebert et al.) Claims 15 and 40 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of U.S. Patent No. 5,784,646 (Sawada). The outstanding rejections to the claims are respectfully traversed.

January 10, 2003 Teleconference

Initially, Applicant wishes to gratefully acknowledge the time that Primary Examiner John Breene and Examiner Schrantz spent with the undersigned in considering Applicant's invention, demonstrably providing superior service to Applicant during prosecution of the present application. Applicant is especially appreciative to have come to some agreement concerning the teachings of the prior art reference Ofek et al. relative to the present invention, and will elaborate upon such thoughts below.

Summary of the Invention

Prior to Applicant's invention, the state of the art in hierarchical storage management for files did not cover partial migration of files in most contexts, i.e., it address the generic desire of a user to migrate predetermined part(s) of a file from a first location to a second location while retaining other part(s) of the file at the first location. In this regard, the state of the art did not provide a mechanism for specifying those regions of a data stream suited to writes and updates and those regions of a data stream suited to off-line or remote storage. In short, sometimes it is desirable to migrate predetermined part(s) of files to remote storage and to retain other part(s) in local storage and current file servers do not enable specification of which data to keep and which data to export elsewhere.

The present invention provides such partial migration abilities, and meanwhile, preserves the data relationships of the migrated part(s) to the unmigrated part(s) via file system metadata as a roadmap to reconstruction of the original file. Thus, if part of a Word Processing document were partially migrated to remote storage, for example, the file system of the present invention enables operations on the original document in its entirety without regard to the fact that some of the document may have been migrated to remote storage.

Such migration capabilities have been clarified in the present amendment via greater description in the preamble and body of the claims. Such subject matter is believed by Applicant to have been inherent in the term "migration," however, for purposes of advancing prosecution of the present application to allowance, such inherent subject matter was included in the claims explicitly via the present amendments.

The Meaning of the Term "Migrate"

In the Jan. 10, 2003 interview, Applicant was asked to clarify the meaning of the term

migrate. In this regard, Applicant will clarify the term and illustrate how the partial migration

capabilities of the invention differ from common file system operations available today.

Initially, it is noted herein that the terms "migration" or "to migrate" in connection with

the present invention are used in common with their ordinary dictionary usage, meaning "to

move from one place, or locality to another." In the context of the migration of data, therefore,

the term migration as used throughout the present application means to move the data from one

place, or memory location, to another place, or memory location.

It is noted by Applicant that a "move" operation is known in the file system art, and

Applicant does not claim to have invented the "move" operation. A prior art move operation

enables a user of a file system to move a file from a first memory location to a second memory

location, so that the file is no longer located at the first memory location. Thus, the entire file,

file system metadata and data alike are moved from the first memory location to the second

memory location in accordance with a prior art "move" operation. The invention differs from a

move operation because the invention enables a partial migration, or partial move, operation

wherein only part(s) of a file are moved to a second storage location, while other part(s) of the

file remain at the first storage location.

One might argue that today, a user could take a file, and with a presently existing file

system, break the file into two or more pieces, and then export, or move, one or more of the

pieces to a second location, in which case the original file would then be located in more than

one place. However, the invention provides a partial migration ability that distinguishes over

such a case as well. With such a presently existing scenario, the user would be creating new file

system metadata, i.e., new files, for each piece of the file. Additionally, the notion of the original

file would be lost, since there would no longer be any file system data or metadata that linked the

pieces together, as a roadmap to illustrate how the pieces fit together to form the original file.

Thus, in short, such a scenario would destroy the notion of the original file to the file system.

However, the prior art nowhere teaches or suggests a file system that provides a partial

migration capability, <u>wherein **part(s)** of a file can be moved</u> from a first memory location to a

second memory location, **and** wherein the notion of "the file" stays intact, i.e., the relationships

of the migrated data of the file to the unmigrated data of the file is preserved. In this regard, the

present invention provides such a system.

The U.S. Patent Application Mentioned in the Background

In the January 10, 2003 telephonic interview, Applicant was also asked to indicate the

relevance of the U. S. Patent Application cited in the background section of the present

application, namely commonly assigned copending application No. 09/449,577, entitled

"Administration of RAID Storage Volumes" ("the '577 application"). The '577 application was

included in the background section to provide an exemplary setting for the present invention, i.e.,

in a computing environment in which multiple volumes and multiple volume providers are

present. The '577 application does not teach or suggest the present invention, in that it describes

a technique for common administration and management of volume providers, but was merely

included because it includes good description of volumes and volume providers, and

characteristics thereof. Since the invention can be used in conjunction with various volumes and

volume providers, Applicant thought it might be beneficial to provide background material

pertaining thereto.

Relation of Independent Claims to Specification

In the January 10, 2003 telephonic interview, for greater clarity, Applicant was also asked

to map independent claim 1 to portion(s) of the specification that provide support for the claimed

invention. In fulfilling such request, Applicant has identified at least the following portions of the

specification that correspond to the limitations of claim 1, as reflected by the following Table.

Independent Claim 1	Corresponding Portions of Specification
A method for migrating a portion of a stream of data having associated file system metadata via a file system from a first storage location to a second storage location in a computer system, comprising:	See, e.g., page 5, lines 1-14
identifying at least one portion of the stream of data for migration to the second storage location;	See, e.g., Fig. 4, steps 410 and 420 Fig. 3A, region Imm1 Figs. 3B-3D, any region not marked ROU (Region of Update) Page 12, lines 18-29
migrating said at least one portion to said second storage location, wherein said migrating includes (A) relocating said at least one portion from the first storage location to the second location and (B) generating additional file system metadata	See, e.g., Arrows of Figs. 3A-3D corresponding to migration of those portions See also, Fig. 4, step 420

relating to said stream of data; and	
preserving said stream's data relationships via said additional file system metadata, whereby said entire stream of data remains accessible to a user of the file system as if said at least one portion of the stream of data were not migrated according to said migrating.	See, e.g., Fig. 4, step 430 Page 13, lines 24-30

Rejection under 35 U.S.C. § 102

Claims 1-8, 12-13, 16, 21-22, 27-35 and 39 stand rejected under 35 U.S.C. § 102 as allegedly anticipated by Ofek et al.

Ofek et al. is understood to be cited merely for its teachings relating to backing up a hard drive, in which two things are admittedly taught by Applicant: (1) that one or more files can be copied to a backup location remote from local storage (and thus a portion of the entire hard drive can be copied to a backup location) and (2) that only what has changed on a hard drive from a first time to a second time need be copied to remote storage as part of the backup process (and thus only a portion of some files on the hard drive need be copied to remote storage).

However, in view of the clarifications made to the claims of the present invention via the present amendment, Applicant respectfully submits that the arguments presented with respect to claims 1, 22 and 30 are now moot. Specifically, Applicant's invention provides a file system that enables partial migration of files, not a backup system. In this regard, the new file system of the invention allows users to preserve local storage, and exploit more voluminous remote storage, while making it appear to a user that all the data is in local storage. Applicant submits

that no other file system has included the ability to generically migrate portions of files to remote

storage.

Thus, nowhere does Ofek et al. teach or suggest:

migrating the at least one portion to the second storage location, wherein the migrating

includes (A) relocating the at least one portion from the first storage location to the second

location and (B) generating additional file system metadata relating to the stream of data; and

preserving the stream's data relationships via the additional file system metadata, whereby the

entire stream of data remains accessible to a user of the file system as if the at least one

portion of the stream of data were not migrated according to the migrating (claim 1),

a data structure stored on a computer-readable medium for storing metadata relating to

migration characteristics of a stream of data wherein at least one portion is migrated via a file

system from a first storage location to a second storage location *wherein the migration includes*

relocation of the at least one portion from the first storage location to the second location and

generation of additional file system metadata relating to the stream of data, comprising: an

identifier identifying the stream of data for which at least one portion is migrated; data

representative of the storage service used in connection with the migration of the at least one

portion; and data representative of the memory mappings of the at least one migrated portion,

whereby the entire stream of data remains accessible to a user of the file system as if the at

least one portion of the stream of data were not migrated (claim 22), or

a computer system including a file system for migrating a portion of a stream of data

having associated file system metadata from a first storage location to a second storage location

in a computer system, wherein *the migrating means to relocate the at least one portion from the first storage location to the second location and generate additional file system metadata relating to the stream of data*, comprising: a hierarchical storage management (HSM) system *for administering a stream of data for partial migration*; and a source storage location having a stream of data stored thereon being serviced by *the* HSM system; wherein *the* HSM system identifies and migrates at least one portion of *the* stream of data to a target storage location according to pre-set criteria and *generates metadata for the description of data relationships of the at least one migrated portion, whereby the entire stream of data remains accessible to a user of the file system as if the at least one portion of the stream of data were not migrated according to the migrating* (claim 30).

Rejections under 35 U.S.C. § 103

Claims 9-11 and 36-38 were rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of Barve et al. Claims 14 and 41 were rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of Boebert et al. Claims 15 and 40 were rejected under 35 U.S.C. § 103 as allegedly unpatentable over Ofek et al. in view of Sawada. However, none of Barve et al., Boebert et al. and/or Sawada cure the above-identified deficiencies of Ofek et al. with respect to the independent claims. Specifically, none of Barve et al., Boebert et al. and/or Sawada teach or suggest a new file system enabling users to preserve local storage, and exploit more voluminous remote storage, while making it appear to a user that

all the data is in local storage via partial migration of files. No other file system has included the such ability to generically migrate portions of files to remote storage.

Accordingly, withdrawal of the rejections under 35 U.S.C. §§ 102, 103 is respectfully requested.

CONCLUSION

Applicant believes that the present Amendment is responsive to each of the points raised by the Examiner in the Official communication, and submits that Claims 1-45 of the application are in condition for allowance. Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

Favorable consideration and passage to issue of the application at the Examiner's earliest convenience is earnestly solicited.

Respectfully submitted,

Date: February 6, 2003

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims, 1, 22 and 30, as follows:

1. (Amended) A method for migrating a portion of a stream of data having associated file system metadata via a file system from a first storage location to a second storage location in a computer system, comprising:

identifying at least one portion of the stream of data for migration to the second storage location;

[moving] migrating said at least one portion to said second storage location, wherein said migrating includes (A) relocating said at least one portion from the first storage location to the second location and (B) generating additional file system metadata relating to said stream of data; and

preserving said stream's data relationships via said additional file system metadata, whereby said entire stream of data remains accessible to a user of the file system as if said at least one portion of the stream of data were not migrated according to said migrating.

22. (Amended) A data structure stored on a computer-readable medium for storing metadata relating to migration characteristics of a stream of data wherein at least one portion is migrated via a file system from a first storage location to a second storage location wherein said migration includes relocation of the at least one portion from the first storage location to the second location and generation of additional file system metadata relating to the stream of data, comprising:

an identifier identifying the stream of data for which at least one portion is migrated;

data representative of the storage service used in connection with the migration of said at least one portion; and

data representative of the memory mappings of said at least one migrated portion, whereby said entire stream of data remains accessible to a user of the file system as if said at least one portion of the stream of data were not migrated.

30. (Amended) A computer system including a file system for migrating a portion of a stream of data having associated file system metadata from a first storage location to a second storage location in a computer system, wherein said migrating means to relocate the at least one portion from the first storage location to the second location and generate additional file system metadata relating to said stream of data, comprising:

a hierarchical storage management (HSM) system for administering a stream of data for partial migration; and

a source storage location having a stream of data stored thereon being serviced by said HSM system;

wherein said HSM system identifies and migrates at least one portion of said stream of data to a target storage location according to pre-set criteria and generates metadata for the description of data relationships of said at least one migrated portion, whereby said entire stream of data remains accessible to a user of the file system as if said at least one portion of the stream of data were not migrated according to said migrating.